

NO 1



TECHNICAL MEMORANDUMS
NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

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No. 213

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"SCHNEEBELI" AND "BIRGER" SILENCERS.

By Charles Dollfus.

From "L'Aeronautique," May, 1922.

June, 1923.

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

TECHNICAL MEMORANDUM NO. 213.

"SCHNEEBELI" AND "BIRGER" SILENCERS.*

By Charles Dollfus.

"SCHNEEBELI" SILENCER.

The Schneebeli silencer, in accordance with the principle applied in its 1920 prototype, aims to accomplish the following results:

1. The introduction, into the exhaust, of air which, mixed with the gases, effects their combustion inside the exhaust pipe.
2. The division of the gases into multiple jets, flowing from the exhaust pipe into hollow air-cooled fins, in order to extinguish the flames and diminish the violence of the detonations at the exit.
3. Evacuation of the gases into the atmosphere through numerous small perforations in said fins, in order to assure a free exit and thus deaden the detonations of the exhaust.
4. Utilization of the draft resulting from motion of airplane, for carrying away gases passing through perforations in fins and producing a suction at the exit, which will assist the functioning of the engine and help it to attain its maximum efficiency.

The Schneebeli silencer is made entirely of soft sheet steel. It is connected with the engine for receiving the exhaust gases, and consists of two parts: the silencer proper and a conical exit.

* From "L'Aeronautique," May, 1922, pp. 146-147.

The chamber is made of five sections autogenously welded together and reinforced at their junctions. Each section is provided with 14 hollow fins fastened to the perforated cylinder by electric welding. The last section is provided with a single plate to prevent the direct exit of the gases through the central tube. The weight of the apparatus is about 95 g (3.35 oz) per HP.

Tested at Villacoublay, the Schneebeli greatly reduced the noise of the airplane. The temperature of the radiator was kept at 58°C (136°F) and the walls of the silencer were not heated to any great degree. In a stationary test, the silencer did not diminish the engine power and emitted no flames on changing engine speed.

"BIRGER" SILENCER.

The Birger silencer, made by the Ad Astra Company in Switzerland, is based on the principle of rapid cooling of the exhaust gases. It consists essentially of a fixed part, a veritable exhaust chamber, and a rotary part, or "rotor," which forms the front end of the device.

The Birger silencer for the 220 HP Benz aviation engine has an ovoid shape of good penetration, a length of 110 cm (43.3 in) and a maximum diameter of 34 cm (13.4 in). The exhaust pipe opens into the pointed, fixed part, which contains the screening chambers for the progressive expansion and deflection of the gases and terminates in a safety valve, provided against the possibility of spurts of flame.

The front part, the rotor, is overhung and rotates on ball bear-

ings about a fixed axis. It contains deflecting partitions and ventilating fins, along which the gases flow in contact with the outer wall and are then expelled. The rotation of this part is produced by means of a circle of fins impelled by the wind from the propeller or the motion of the airplane.

It is easily understood that, since the gases enter the center of the device and escape at the periphery, their contraction creates a suction which facilitates their motion. Moreover, the rotation projects the gases toward the periphery, resulting in a further suction due to the cooling. The gases leave the chamber at a low temperature, thus eliminating the danger of fire. The rotation does not produce a mechanical suction, but facilitates the cooling of the gases, by forcing them against cold walls.

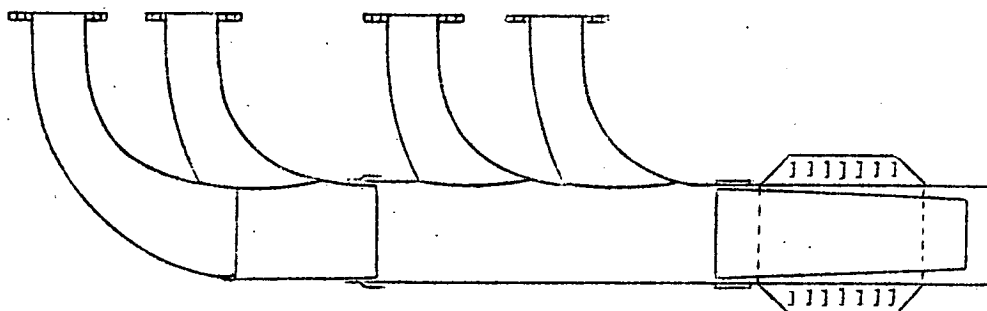
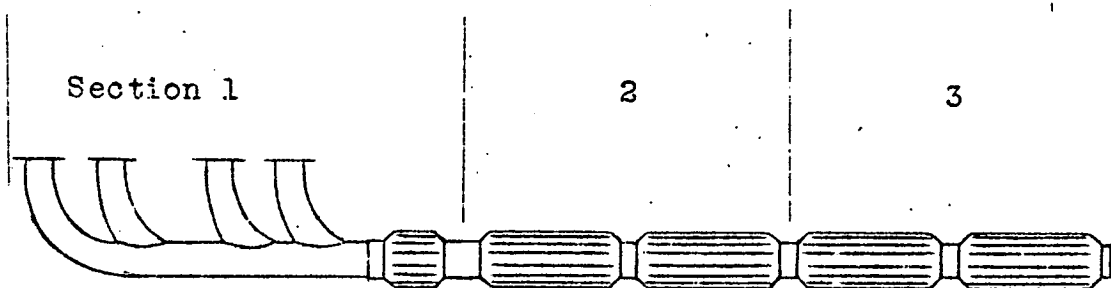
The Birger silencer is made of sheet iron, with an aluminum rotor, and is easy to take apart and clean. It has produced a better cooling of the engine, even on the testing bench.

The fuel consumption appears to be diminished from 3 to 5%, the aspiration of the remains of the exhaust gases improving the explosive mixture. Flight tests, totaling 30 hours, were made in 1921, in five-hour flights. The encrusting of the valves and spark plugs was diminished and the noise was greatly reduced. The weight of the device would be from 9 kg (19.8 lb) to 10 kg (22 lb), for a 250 HP engine. The rotation speed of the cone was 1500 R.P.M. on an L.V.G. airplane with a 220 HP engine. It was carried to 3000 R.P.M. in endurance tests. According to the tests made at Villacoublay, the weight of a Birger, for a Breguet 14A-2 airplane with

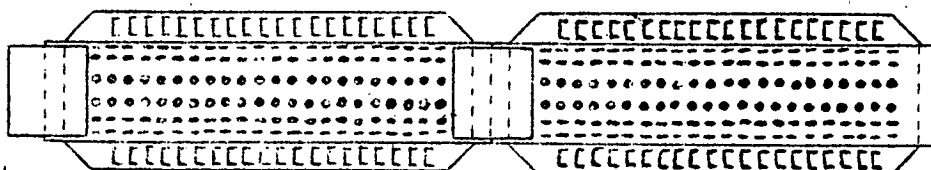
a 300 HP Renault 12 Fe engine, would be 31 kg (68.3 lb), or 19 kg (41.9 lb) more than the ordinary exhaust chamber, In this design the circle of fins is replaced by spiral grooves (See attached drawing). Its head resistance slightly reduced the speed of the airplane. It should, however, be borne in mind that this is only an experimental device. In preventing the appearance of flames, the Birger silencer has given the best results, even on very dark nights.

It is to be hoped that we may see a continuance of these experiments, so evidently useful to the general progress of aviation.

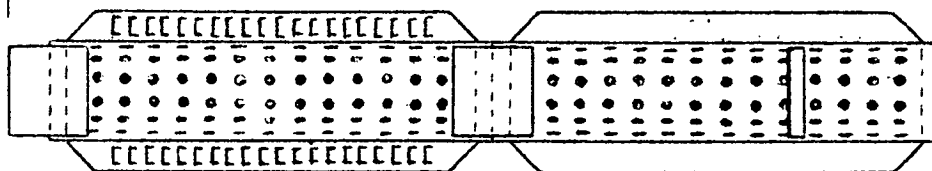
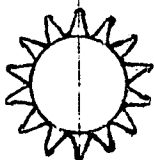
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Enlargement of section 1.

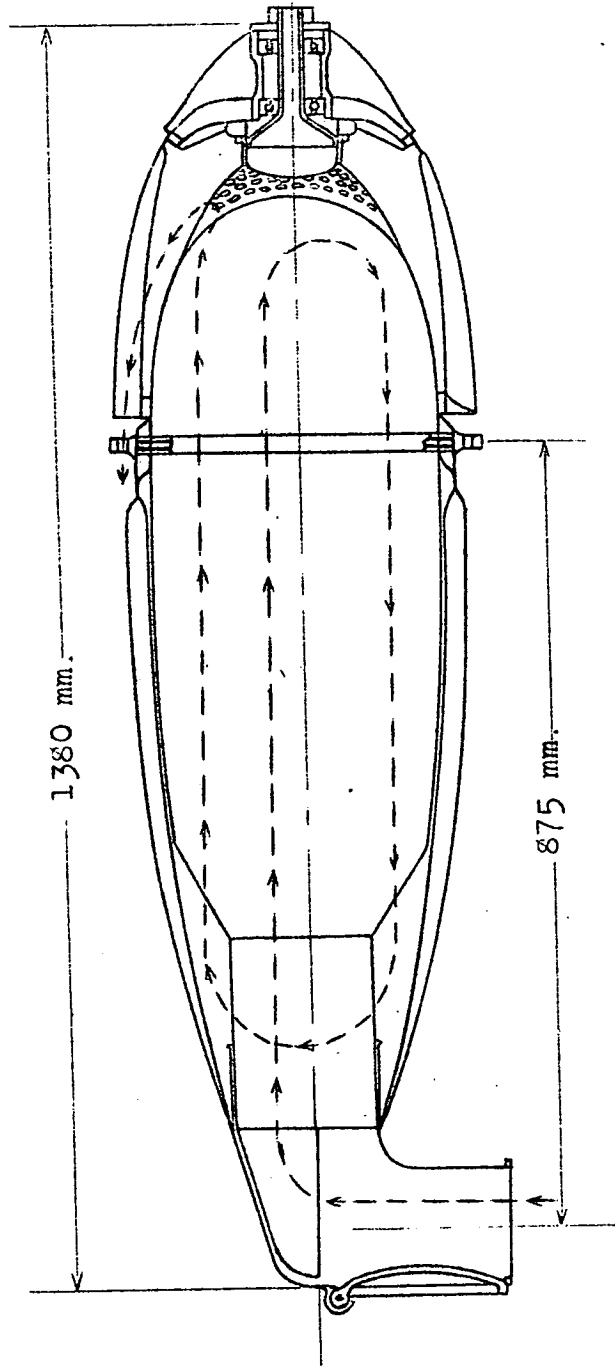
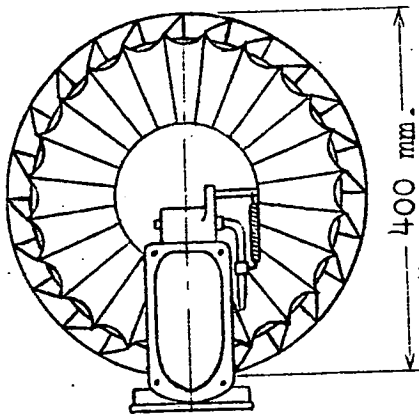
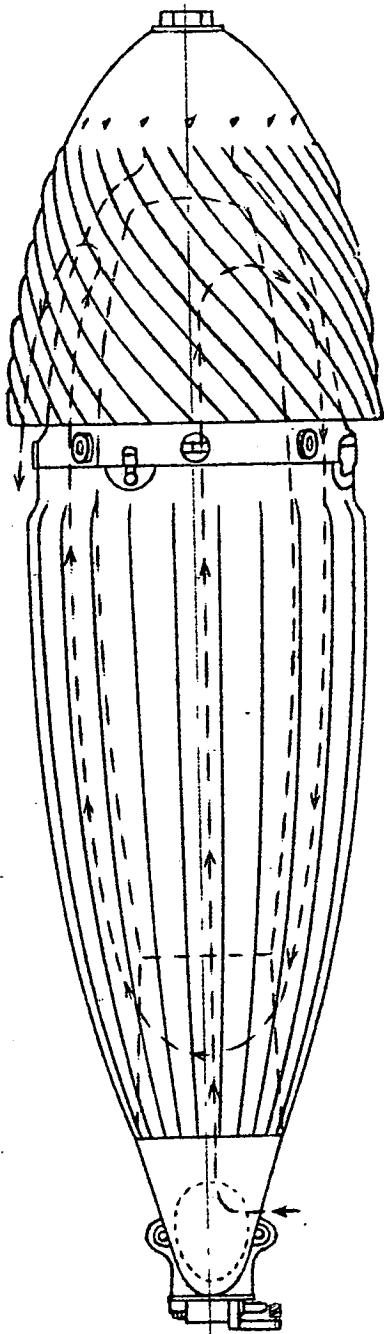


Enlargement of section 2.



Enlargement of section 3.

Assembly and enlarged sections of the Schneebeli silencer.



Birger Silencer
for 300 HP engine.